

# PATENT SPECIFICATION

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## DRAWINGS ATTACHED

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## (54) IMPROVEMENTS IN OR RELATING TO CONSTRUCTIONAL ELEMENTS

- (71) We, ÖSTERREICHISCHE DOKA SCHALUNGS-UND GERÜSTUNGS-TECHNIK GESELLSCHAFT M.B.H. an Austrian body Corporate, of 5 Kohlmarkt, Vienna 1, Austria, do hereby declare the nature of this invention, and in what manner the same is to be performed, to be fully described and ascertained in and by the following statement:—
- 5 The present invention relates to constructional elements of the general type comprising major faces separated by spacers. With respect to elements having a solid generally homogenous cross-section, such elements have the considerable advantage of strength and relatively light weight. In practice, they are, therefore, increasingly frequently taking the place of solid wooden boards and supports, more particularly because, in the building industry, in order to save on assembly costs, such boards and supports which are as large as possible, are being used to a continuously increasing extent. Today, therefore, as a rule, considerably higher demands regarding bearing capacity, and bending strength are being made on such elements than hitherto.
- 10 Constructional elements having laminated wooden surface layers are already known, but such known elements, which are usually used as casing boards, are, relatively expensive and as a rule, not particularly satisfactory for the following technical reasons.
- 15 The major faces of known boards are made from ply-wood having at least three plies. Due to the swelling and shrinking of these plies, it is only possible to make an intertently stable ply-wood board if it is symmetrically built up from the centre outwardly so that the stresses arising in the plies on both sides mutually cancel each other out. Since the plies are obtained by co-called skimming or planing of tree-trunks, they are usually very thin. Since, however, a certain minimum thickness is necessary for the major faces of such boards in order to give sufficient stability thereto, the major faces must, in practice,
- 20 consist of 5, 7 or more plies. Such multi-layer ply-wood boards require, however, an extensive amount of glueing in manufacture and are, therefore, relatively expensive.
- 25 Thin ply-wood boards have the further disadvantage that their plies can very quickly be parted off during rough handling on building sites, whereby the surfaces of the casing boards become unattractive which is a disadvantage or is undesired in the manufacture of finishing, i.e. visible concrete. Since the inner layers of ply-wood are usually of a poorer quality than the outer layers thereof, layers of ply of poorer quality reach the upper surface of the board, which can withstand the rough handling on building sites to an even lesser extent.
- 30 Boards having one-layer major surfaces can be made, for example, from solid wooden boards in contact which, as a rule, extend transversely to the spacer members. Such boards are, however, unsuitable, since the solid wooden boards warp and split and result in an unusable casing surface. On shrinking of the boards, spaces also appear therebetween which are undesired. Also such a board gives no stability and is not resistant to bending to the desired extent.
- 35 The above-described disadvantages also relate to hollow-box supports, such as beams or girders.
- 40 It is, therefore, an object of the invention to provide an improved constructional element of the above-mentioned general type, and which is cheap to manufacture but, despite this, is so formed as to be of extraordinarily high resistance to bending and to have a high bearing capacity without the danger existing that the major faces may warp as a result of swelling or expanding, or form unsightly splits.
- 45 According to the invention there is provided a constructional element comprising a pair of laminated wooden major faces rigidly connected together in spaced-apart parallel relationship by elongate spacer means extend-

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advantageous if the inner layers 5 are slightly thicker than the outer layers 4.

The two casing boards shown in Figs. 1 and 2 differ from each other primarily only in that the spacers 3 in the embodiment according to Fig. 1 are made from solid wood, whereas the spacers 8 in the embodiment according to Fig. 2 are made from three layers. These layers may have mutually crossing grains, and be glued together. This construction is of greater advantage where the distance between the two major faces 1, 2 is relatively large.

Figs. 3 and 4 show a support formed from two stringers 11 made from solid wood and major faces in the form of side walls 9, 10, arranged on both sides of said stringers. The side walls are made from two layers or laminations 12, 13, the grain of the outer layers 12 of which extends along the support. The direction of the grain of the inner layers 13 extends at right angles to the support. Thus, the side walls have an extraordinarily high resistance to breaking and splitting in all directions. Warping of the walls and the complete support is, therefore, prevented or substantially minimised by the mirror inverted arrangement of the grain of the side walls. It may be advantageous to keep the layers 13 on the inside of the support slightly thicker than the layers 12 on the outside thereof.

The two stringers 11 of the support do not necessarily have to be made from solid wood but can be formed from three or more layers (as in the embodiment of Fig. 2) if this is desired, for example for reasons of strength. A support having solid wooden stringers according to the embodiment shown, having double-layer side walls is, however, so stable that it is satisfactory for most requirements.

In the embodiment shown in Figs. 3 and 4, the stringers are provided with openings 14 exactly facing one another and located in the region of the central longitudinal axis i.e. in the zone of zero strain when the support is subjected to bending stresses. These openings can, for example, when using the support with concrete shuttering, be used for the passage of the tensioning rods.

It may be advantageous to provide the exteriors of both the major faces or side walls of an element according to the invention with a synthetic resin coating for protection. In order to prevent concrete from penetrating the intermediate chambers defined between the major faces or side walls, and the spacers or stringers, these intermediate chambers can, moreover, be filled with a light and cheap filler material, for example, a synthetic foam material. Dropping out of this filler material from the intermediate chambers can be avoided

or minimised by sealing strips extending transversely to said spacers or stringers.

Elements according to the invention have proven to be not only cheap and of extraordinarily high bearing capacity and resistance to bending but, additionally, they are very light and practically wholly free from warping. A further advantage resides in the fact that the major faces or side walls need not be made from a very hard and brittle wood, and therefore the element may be nailed without too much difficulty. Thus, such elements are very suitable for quantity production.

#### WHAT WE CLAIM IS:—

1. A constructional element comprising a pair of laminated wooden major faces rigidly connected together in spaced-apart parallel relationship by elongate spacer means extending all in the same direction relative to the element length, wherein each of said major faces consists of two glued wooden layers of cut boards, the grains of which extend at least substantially at right angles to each other.

2. An element as claimed in claim 1, wherein the grains of the two inner and the two outer layers of said major faces are respectively parallel to each other.

3. An element as claimed in claim 1 or 2, wherein the outer and the inner layers of said major faces are respectively of the same thickness.

4. An element as claimed in any of the preceding claims, wherein said two-layer major faces are each formed from one piece of a single three-layer board separated down its centre.

5. An element as claimed in any of the preceding claims, wherein said major faces are made from soft wood.

6. An element as claimed in any preceding claim, wherein the grains of the outer layer of each major face extend parallel to the spacer means and the grains of the inner layer of each major face extend orthogonally thereto.

7. An element as claimed in any of the preceding claims wherein the spacer means comprise a plurality of separate spacers.

8. An element as claimed in claim 7 wherein the distance between any two such separate spacers is less than eight times the thickness of the major faces.

9. An element as claimed in claim 7 or 8 wherein the spacers are made from solid wood.

10. An element as claimed in claim 7 or 8 wherein the spacers consist of a plurality of layers having mutually crossing grains, the layers being glued together.

11. An element as claimed in any of the preceding claims wherein the intermediate spaces between the spacer means and the major

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COMPLETE SPECIFICATION

3 SHEETS

*This drawing is a reproduction of  
the Original on a reduced scale*

Sheet 1

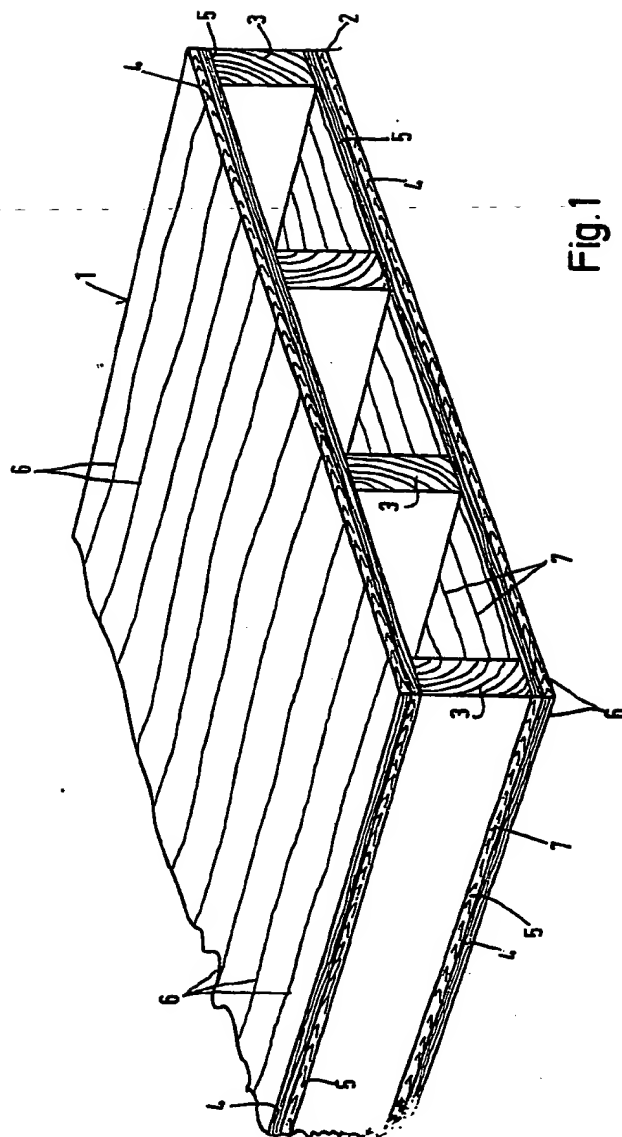


Fig. 1

Fig.3

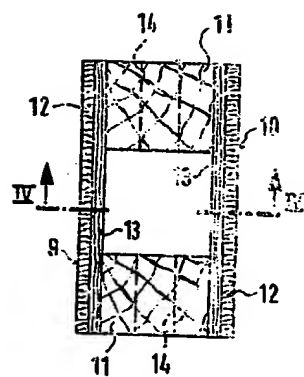


Fig.4

